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XIX.

A Catalogue of Standard Polar and Clock Stars, for the Reduction of Observations in Right Ascension ; with a Discussion of their Positions.

By TRUMAN HENRY SAFFORD.

(Communicated September 9, 1862.)

THE object of the present Catalogue* is to furnish (additional to the very accurate positions of the Berlin Jahrbuch) the means of reducing observations of right ascension with greater convenience and accuracy, and in a somewhat more systematic manner, than by the aid of former catalogues. It is divided primarily into two catalogues, the one of "polar stars," the other of "clock-stars," so called ; with a supplementary list of stars which for large instruments are not commonly used in either capacity, but merely as tests of the accuracy of observation and reduction.

Excepting 25 "polar stars," all the stars here given are found either in the Nautical Almanac Catalogue, or in that of the Berlin Jahrbuch.

This Catalogue contains, then, in the first place, the 47 stars of whose apparent places an ephemeris is given in the Jahrbuch ; 2 of these being "polar stars," 36 "clock-stars," and 9 of the supplementary list.

In the second place, our Catalogue contains the 25 "polar stars" — stars within 10° of the north pole — mentioned above.

In the third place, all the stars of the Nautical Almanac Catalogue are here given, except α Columbæ and δ Sculptoris, ζ Ursæ Minoris, η Draconis, and γ Cephei, and also the stars below 45° of south declination.

The mean positions in this Catalogue of the 47 stars are derived from Wolfers's

* The Catalogue was originally computed for the use of the Observatory of Harvard College, and has been applied since May, 1862, in the reduction of transits. It is published here with the approval of the Director.

Tabulae Reductionum,* without further investigation. It will be often convenient to have them in the form here presented, which differs from that adopted in those tables. The secular variations given for these stars are the same which Wolfers used, and which are taken from the *Tabulae Regiomontanae*.

Computation of the Mean Places of 25 Polar Stars.

In this discussion the following catalogues have been employed; to the name of each catalogue has been prefixed the abridgment by which it is cited in the course of the work:—

Br. The Fundamenta Astronomiae (full title given in this volume of the Memoirs of the Academy, Pt. I. p. 299).

Gr. Groombridge (full title, *loco modo citato*).

Str. 1815. F. G. W. Struve, Observationes Astronomicae institutae in Specula Universitatis caesariae Dorpatensis. Vol. I. Pars II. Dorpati. 1817. 4to.

Str. 1824. Stellarum Fixarum imprimis duplicium et multiplicium Positiones Mediae pro Epochâ 1830.0 deductae ex observationibus meridianis annis 1822 ad 1843 in Specula Dorpatensi institutis; auctore F. G. W. Struve. Petropoli ex typographia academica, 1852. Fol. The positions which I have used are a few for 1824.0 from the Introduction, page xxxviii. *et seqq.*

Schw. Schwerd's Beobachtungen von Circumpolarsternen in mittleren Positionen 1828.0. Von Wilhelm Oeltzen. Aus dem X. B^{de} der Denkschriften der Mathem.-Naturw. Classe der K. Akademie der Wissenschaften. . . . Wien, 1856. 4to.

Arg. DLX Stellarum Fixarum Positiones Mediae ineunte Anno 1830. . . [auctore] Argeland[ro]. . . . Helsingforsiae, 1835. 4to.

Pond. A Catalogue of 1112 Stars reduced from Observations made at the Royal Observatory at Greenwich from the Years 1816 to 1833. London. . . . 1833. Fol.

Hend. Astronomical Observations made at the Royal Observatory, Edinburgh, by Thomas Henderson. . . . Vol. III. [to V.] for the Year[s] 1837 [to 1839]. Edinburgh. 1840 [–1843]. 4to.

[The same] reduced and edited by his successor, Charles Piazzî Smyth. Vol. VI. [–IX.] for the Year[s] 1840 [–1845]. 4to.

* *Tabulae Reductionum Observationum Astronomicarum* ab anno 1860, usque ad 1880. Auctore J. Ph. Wolfers. Additur, *Tabulae Regiomontanae* ab anno 1850, usque ad 1860, ab Ill. Zech continuatae. Berolini, 1858.

Rob. Places of 5345 Stars observed from 1828 to 1854 at the Armagh Observatory, by Rev. T. R. Robinson, D. D. Dublin, 1859. 8vo.

Airy. Airy's "Twelve-Year Catalogue," "Six-Year Catalogue," "Greenwich Observations" from 1854–1858. (For full titles see my paper previously cited, in the present volume, pp. 300, 301.)

The "Greenwich Observations" for 1859 and 1860 have come to hand since the main part of these calculations were made.

Joh. The Radcliffe Catalogue of 6317 Stars chiefly Circumpolar reduced to the Epoch 1845.0, formed from the Observations made at the Radcliffe Observatory under the Superintendence of Manuel John Johnson, M. A., late Radcliffe Observer. With Introduction by the Rev. Robert Main, M. A., Radcliffe Observer. Oxford. 1860. 8vo.

Car. A Catalogue of 3735 Circumpolar Stars observed at Redhill in the years 1854, 1855, and 1856, and reduced to Mean Positions for 1855.0, by Richard Christopher Carrington. London. 1857. Fol.

LeV. Annales de l'Observatoire Impérial de Paris publiées par U. J. Le Verrier, Directeur de l'Observatoire. Observations. Tome XII. [XIII.] Paris. 1860, [1861]. 4to.

Tomes XIV., XV. were received later.

I found, when too late to use them, that Airy's Cambridge Observations contained two or three places which should have been inserted.

No use was made of the *Histoire Céleste*, or Fedorenko's Catalogue; nor of Piazzini, nor Groombridge's right-ascensions. Any material from these sources is of uncertain accuracy; or would require insecure systematic corrections.

The method by which mean places for 1855, and proper motions referred to the ecliptic of the same year have been found, is as follows: The positions of the Fundamenta, where such existed, were reduced from 1755 to 1855 by the use of Struve and Peters's data. In some cases where there was no observed declination for 1755, a value for 1755 referred to the ecliptic of 1855 was assumed, and by a slight modification of the method given in the introduction (p. ix.) to the *Tabulae Regiomontanae* (see, also, Wolfers's *Tabulae Reductionum*, pp. lii., liii. of the Introduction) was made to serve the same purpose. For if (see the place just cited) δ' be supposed known, we shall have $([32]) x = \frac{\delta' - (d' + d)}{\beta + \alpha}$. In this case the declination for 1755 corresponding to that assumed for the ecliptic of 1855, will be $\delta = d' - d + (\beta - \alpha) x$.

The indirect form of Bohnenberger's method which Bessel has given, and which

has been transferred by Wolfers, is greatly preferable to the more direct one. It needs a little more care, however, in the computation.

We have now positions for 1755, referred to the ecliptic of 1855, which agree with *all* the data of the Fundamenta referring to these stars. We have also some modern observations referred with more or less accuracy to the ecliptic of the same epoch, or which we can easily refer to that ecliptic approximately. These give us the means of obtaining a formula which shall be of the form

$$\alpha = \alpha^\circ + h^\circ (t - 1755), \quad \delta = \delta^\circ + i^\circ (t - 1755).$$

Where $\alpha^\circ \delta^\circ$ are (Bessel's) Bradley's positions of 1755, in cases where they are complete, referred to the co-ordinate-planes of 1855; or, in case the Fundamenta position of 1755 is incomplete, α° is the AR. for 1755 referred to the ecliptic and equator of 1855, by means of δ° , as explained above; δ° being here arbitrary within certain small limits: where again $h^\circ i^\circ$ are *assumed* proper motions referred to the ecliptic and equator of 1855, but *so* assumed as to nearly represent more modern observations. For stars not in the Fundamenta, $\alpha^\circ \delta^\circ$ are both arbitrary.

In other words, if all observed positions are referred to 1855 by precession alone, the formulæ

$$\alpha = \alpha^\circ + \text{etc.}, \quad \delta = \delta^\circ + \text{etc.},$$

would represent those taken from the Fundamenta *exactly*, and all others *nearly*. But as certain positions are exceptionally incomplete, and others so as a rule, we shall not attempt so to refer them, but shall proceed in the opposite way. We shall compute theoretical places of each star for the epochs of the catalogues. This will be done most conveniently by computing places for epochs at equal intervals, which can then be tested, and afterwards interpolated; thus saving labor, and securing accuracy.

Table I. contains the assumed values of $\alpha^\circ \delta^\circ h^\circ i^\circ$. For the stars contained in Bradley, the values of α° and δ° have been verified by Mr. A. Hall, now Aide at the U. S. Naval Observatory, Washington; who has recomputed the positions referred to the ecliptic of 1755 from them.

From these values positions for 1810, 1830, 1850, 1870 were computed, and in some cases for 1820, 1840, 1860; using Struve and Peters's constants. The positions for 1815 were computed independently, and also interpolated as a check. The proper motions ($h' i'$), and secular variation (in AR.) were computed for 1830 and 1850; the former by formulæ which will afterwards be cited with some modifications from Bessel, and the latter by the formula,

$$0''.0284 + 0''.1950 [\text{tg } \delta'^2 + \frac{1}{2}] \sin 2 \alpha' + 0''.4481 \sin (\alpha' + 91^\circ 6') \text{tg } \delta' + 0.01944 [h' \text{tg } \delta' \cos \alpha' + i' \sec \delta'^2 \sin \alpha'].$$

The secular variation in declination is

$$- 0''.1950 \operatorname{tg} \delta' \sin \alpha'^2 + 0''.4481 \cos (\alpha' + 91^\circ 6') - 0''.01944 h' \sin \alpha'.$$

This, however, it was not necessary to compute, as existing catalogues furnished by interpolation sufficiently accurate values for our immediate purpose, which was to test the computed right-ascensions and declinations.

Table II. contains the comparison of the theoretical and observed positions; the observed positions having been corrected so as to correspond to the same proper motions as had been previously computed.

In certain cases it was necessary to form the "observed" positions by combining the results of several years' observations. For Henderson's and Le Verrier's AR. this was done by means of the annual variations derived from our computed places: for the Greenwich observations, by the annual variations given in the separate volumes. In either case care was taken to have the "mean epoch" adopted correspond very precisely to the mean of the times of observation.

The computed right-ascension and declination of a star for any time depend strictly each upon four elements (besides precession); upon the AR. and proper motion in AR. for some fixed epoch, and also the Decl. and P. M. in Decl. for the same epoch.

Let α, δ , be the star's right-ascension and declination at the time $t + 1855$, referred to the co-ordinate planes of 1855; α' and δ' being the right-ascension and declination for the same time, referred to its own co-ordinate-planes.

Then, if we vary the assumed AR. for 1855 by η and the assumed proper motion in AR. for n years by η' ; the assumed Dec. for 1855 by ι , and the assumed proper motion in Dec. for n years by ι' ; we shall have

$$\Delta \alpha = \eta + \frac{\eta' t}{n}, \quad \Delta \delta = \iota + \frac{\iota' t}{n}.$$

[In our calculations we shall make $n = 30$.]

Again (*Fundamenta Astronomiæ*, p. 304 (15)).

$$\begin{aligned} \Delta \alpha' &= \Delta \alpha (\cos \theta + \sin \theta \operatorname{tg} \delta' \cos (\alpha' + \lambda' - z')) + \frac{\Delta \delta}{\cos \delta} \frac{\sin \theta \sin (\alpha' + \lambda' - z')}{\cos \delta'}, \\ \Delta \delta' &= - \Delta \alpha \sin \theta \sin (\alpha' + \lambda' - z') + \frac{\Delta \delta}{\cos \delta} \cos \delta' (\cos \theta + \sin \theta \operatorname{tg} \delta' \cos (\alpha' + \lambda' - z')). \end{aligned}$$

The notation here used is that of the *Fundamenta*.

Let

$$\begin{aligned} \sin \theta \sin (\alpha' + \lambda' - z') &= m \sin \xi, \\ \cos \theta \cos \delta' + \sin \theta \sin \delta' \cos (\alpha' + \lambda' - z') &= m \cos \xi, \end{aligned}$$

taking the quadrant of ξ , so that m shall be positive.

We shall readily find (*Fundamenta*, p. 300 (9))

$$\sin \delta = \cos \theta \sin \delta' - \sin \theta \cos \delta' \cos (\alpha' + \lambda' - z'),$$

$$\sin \delta^2 + m^2 = \sin \delta'^2 + m^2 \sin \xi^2 + m^2 \cos \xi^2 = 1.$$

Hence,

$$m^2 = \cos \delta^2; m \text{ (always positive)} = \cos \delta,$$

$$\sin \xi = \frac{\sin \theta \sin (\alpha' + \lambda' - z')}{\cos \delta},$$

and

$$\Delta \alpha' \cos \delta' = \Delta \alpha \cos \delta \cos \xi + \Delta \delta \sin \xi,$$

$$\Delta \delta' = -\Delta \alpha \cos \delta \sin \xi + \Delta \delta \cos \xi.$$

Hence, again,

$$\Delta \alpha' \cos \delta' = \left(\eta + \frac{\eta' t}{30} \right) \cos \delta \cos \xi + \left(\iota + \frac{\iota' t}{30} \right) \sin \xi,$$

$$\Delta \delta' = -\left(\eta + \frac{\eta' t}{30} \right) \cos \delta \sin \xi + \left(\iota + \frac{\iota' t}{30} \right) \cos \xi.$$

If η , η' , ι , ι' be of the nature of corrections to the assumed place, and $\Delta \alpha' \cos \delta'$, $\Delta \delta'$ be of an *opposite* character,—that is, be “computed — observed,” — we must necessarily change the sign of one term; or, what is the same, transfer $\Delta \alpha' \cos \delta'$, $\Delta \delta'$ to the right members of their proper equations.

We have now the form of the equations of condition; perfectly rigorous. It is, however, obvious that in most cases perfect rigor is not necessary. For example, for stars near the equator no one would think of considering the declinations of 1755 as so erroneous that a perfectly accurate reduction of AR. to 1855 could not be effected by its means.

The rigorous course has here been followed for the four stars for which the value of $\sin \xi$ was the largest. These stars are λ Ursæ Minoris (Bode), 51 Cephei Hevelii, 4 Ursæ Minoris (Bode) and 20 Ursæ Minoris (Bode).

For the remaining stars of our polar list, a value of ι , ι' was deduced from the observed declinations, assuming that η , η' were = 0. Substituting these values in the equations derived from the right-ascensions observed, the values of η , η' were now obtained; employing in both cases the method of least squares, as will be further explained in its place.

These values of η , η' were now substituted in the declination equations, and a new set of values of ι , ι' , differing by very small amounts from the former, were obtained.

The effect of these corrections was in no case over $0''.01$, when substituted in the right-ascension equations; so that the former values of η , η' were retained.

This process is equivalent simply to this: the computed declinations derived from our final theory are virtually employed to reduce the observed right-ascensions to 1855.0, and the resulting right-ascensions treated by the method of least squares give the final values of right-ascension and proper motion.

It remains to explain the details of the application of the method of least squares. For the four stars treated rigorously we have

$$\frac{\eta}{15} = w, \quad \frac{\eta'}{15} = x, \quad \iota = y, \quad \iota' = z.$$

The assumed weights are denoted by ω for right-ascension, by ω' for declination. These were assigned in a somewhat arbitrary manner; bearing in mind the magnifying power of the various instruments employed, and in one or two instances the less than usual care bestowed on observation and reduction. It is possible that the weight which has been assigned is in some cases too large or too small; thus Bradley's observations have received a weight which, though small in itself, is yet rather larger than the probable error as given in the *Fundamenta* would seem to warrant. This, however, if an error, is but a venial one, as the *Fundamenta* are justly considered as entitled to a very large proportional weight.

In all cases where many observations have been made at the same observatory and with the same instrument, less than the proportional weight has been given. The maximum weight has been put at 3, while the minimum for a single observation has been $\frac{1}{3}$.

We shall now make in AR.

$$a = \sqrt{\omega} \, 15 \cos \delta \cos \xi,$$

$$b = a \frac{t - 1855}{30} = \frac{a t}{30} \text{ [if } t \text{ be counted from 1855]},$$

$$c = \sqrt{\omega} \sin \xi,$$

$$d = c \frac{t - 1855}{30} = \frac{c t}{30} \text{ [if } t \text{ be counted from 1855]},$$

$$n = \sqrt{\omega} \, \Delta a' \cos \delta' \text{ [taking } \Delta a' \text{ in the sense } c - o].$$

And in declination

$$a = -\sqrt{\omega'} \, 15 \cos \delta \sin \xi,$$

$$b = \frac{a t}{30},$$

$$c = \sqrt{\omega'} \cos \xi,$$

$$d = \frac{c t}{30},$$

$$n = \sqrt{\omega'} \Delta \delta'; (c - o).$$

The equations of equal precision for these four stars will be of the form

$$0 = n + a w + b x + c y + d z,$$

whose solution by least squares is a mere matter of mechanical computation, according to Encke's form in the *Jahrbuch* for 1836.

For the polar stars excepting these four we shall put

$$\begin{aligned} x &= \eta \cos \delta, & x' &= \iota, \\ y &= \eta' \cos \delta, & y' &= \iota', \end{aligned}$$

and the quantities $x y$ will be eliminated from the declination equations, and $x' y'$ from those in right-ascension by the process mentioned above. We have, then, making

$$\begin{aligned} a &= \sqrt{\omega} \cos \xi, \text{ or } \sqrt{\omega'} \cos \xi, & \Delta n (\text{AR.}) &= \sqrt{\omega} \left[\iota + \frac{\iota' t}{30} \right] \sin \xi, \\ b &= a \frac{t}{30}, & \Delta n (\text{Dec.}) &= -\sqrt{\omega'} \left[\eta + \frac{\eta' t}{30} \right] \sin \xi \cos \delta', \end{aligned}$$

the following equations of equal precision in right-ascension

$$0 = n + \Delta n + a x + b y = n' + a x + b y,$$

and in declination

$$0 = n + \Delta n + a x' + b y' = n' + a x' + b y'.$$

The process of forming these is, — 1st, assume in declination $\Delta n = 0$, and form and solve the declination-equations; 2d, substitute these values of x' , y' or ι , ι' in the equation for Δn in AR., and form and solve the right-ascension equations. This gives the means of correcting the declination-equations. These last corrections were shown by trial to have no perceptible effect on the equations for AR., and the process of approximation ceased here.

Tables III. and IV. contain the formation and solution of the equations. In order to add new equations in future, we must, after determining the weights, compute for the epoch in question the theoretical AR. and Dec. derived from the numbers in Table I.

Comparing these with the new observations, as in Table II., the quantities $\Delta \alpha'$, $\Delta \alpha' \cos \delta'$, $\Delta \delta'$ will be readily formed. If the star be one of the four strictly treated, the equations can be at once formed, by the formulæ for that purpose. Then the quantities $a n$, $b n$, $c n$, $d n$, etc., as also $a a$, $a b$, $a c$, etc., being computed for each new equation, and added in the proper place; the final equations in Table III. Part I. being

$$\begin{aligned} 0 &= [a n] + [a a] w + [a s] x + [a c] y + [a d] t, \\ 0 &= [b n] + [a b] w + [b b] x + [b c] y + [b d] z, \\ &\text{etc.,} \qquad \text{etc.,} \end{aligned}$$

will give at once new final equations which can be solved.

For the 21 other stars, the corrections in declination must first be computed, according to the values of α' and γ' given in Table III. Part II.; after this is done, the quantity Δn for the new equations in AR. can be formed, and their solution will present no difficulty. It will in general make no difference whether the new values of x and y , or those already given in Table III. Part II. be used, to obtain Δn for declination. In either case there will be no difficulty in computing Δn for the new observations, and thus forming the new equations according to the precepts for the old.

An extreme case may occur, where it will be found that Δn for AR. would differ by a sensible amount when computed according to the new values of α' and γ' . This, however, will not happen for a good many years.

It remains merely to explain Tables V., VI., which contain the calculations of AR. for the clock-stars. (Table VI., Supplement, contains the positions of the more northern stars not often used as clock-stars.)

The method here pursued was, to form positions for the years 1838–40, 1850, 1854–1858, and in some few cases for 1859, depending on the places of the Fundamenta for 1755, and the “Greenwich Results” for 1855. The positions of the Fundamenta were assumed as correct systematically, because the mean difference between the former reduction and Le Verrier’s and Peters’s new reductions of the 36 stars called “fundamental” is almost precisely zero; and so far as the casual errors of Bessel’s places are concerned, it seemed possible to diminish their influence in great part by using comparatively late modern observations.

One of the objects of the observations now in progress at Cambridge, for the reduction of which these tables are designed, is to deduce new places of the fundamental stars, and to afford materials for a thorough examination of the relative systematic errors, whatever they may be, of the fundamental catalogue employed, so that for our purpose it is best to have a catalogue which is symmetrical as far as may be; which would not

be the case if we made a doubtful application of the method of least squares. The method here employed is the best I could devise for bringing down the relative errors of near stars.

The form of reduction proposed, and to some extent actually carried out, will enable the following things to be done with great ease: firstly, to reduce (if desired) the observations of each star so as to depend directly on the *Tabulae Reductionum*, and, secondly, to re-compute from our own observations the places of all the stars of the present list, so as to depend solely on our own observations, so far as our instrumental means will permit.

The positions derived from the Greenwich results for 1855, compared with Bessel's for 1755, will, assuming the correctness of the latter, require the addition of $x \frac{(t - 1755)}{100}$, where x is a correction applicable to the places for 1855.

The positions given in the Edinburgh observations of 1838, 1839, 1840 were compared then with our calculated places, and would give in the mean the quantity

$$0.84 x = \left(\frac{1839 - 1755}{100} \right) x,$$

after correcting them, to reduce to the equinox of Wolfers. See *Tabulae Reductionum*, p. xliii., at bottom, where we find

$$\text{N. C. — Henderson} = + 0^{\text{s}}.038 \text{ (for 1830).}$$

Reducing this to 1839, the mean epoch of the observations used

$$\text{N. C. — Henderson} = 0^{\text{s}}.043 \text{ (for 1835).}$$

The number $+ 0^{\text{s}}.044$ was used instead; the change will be insensible.

The Edinburgh observations after 1840 were not used. The same catalogue had been employed to reduce them that was also employed at Greenwich for the same year, and the resulting numbers (it was feared) were not precisely homogeneous with those of the former years. The few observations made at Edinburgh on the new list of 47 stars introduced in 1857 into the Nautical Almanac were omitted. The Greenwich catalogue for 1850, depending, as is well known, upon the two instruments employed at Greenwich, — the old Transit and the new Transit-Circle, — was also compared. The Greenwich observations from 1854 to 1858 were compared; after the work was nearly complete, the volume for 1859 was received, and used for a few stars inadequately observed in the preceding years.

The Paris observations of 1856 and 1857 were also used. To my great regret, the

volumes for 1858 and 1859 did not come to hand till after the completion of the computations. The corrections for equinox here used were

Gr. C. 1850	+ 0 ^s .017,
Gr. Obs. 1854 — 1859	+ 0 ^s .027,
Paris	+ 0 ^s .056.

The mean of the corrected deviations of these four catalogues from the computed places, gives the correction x° for the mean t° of the dates. This was reduced to 1855 by the formula $x = x^\circ \frac{100}{t^\circ - 1755}$, the correction x was applied to the assumed places for 1855 (the Greenwich results 1855), and the right-ascensions of Table VI. formed. The annual variation given here is that which results from the combination of the mean annual variation derived from these right-ascensions compared with Bessel's Bradley, with the secular variation of the last column; which had been computed.

For the 47 stars given by Wolfers the positions are derived from the materials of his work, and are here computed for convenience' sake.

TABLE I.

Star's Name.	α°	h°	δ°	i°
43 Cephei Hevelii	12 24 6.64	+0.95	85 28 36.24	—0.10 —0.05
Groombridge 527	36 47 36.39	+0.40	80 49 47.09	
323 Cephei (Bode)	49 48 50.00	+2.00	86 10 45.30	
Groombridge 750	58 6 11.20		85 9 51.60	
64 Camelopardali (Bode) . .	78 59 48.00		85 6 24.30	
51 Cephei Hevelii	97 46 45.00		87 15 9.00	+0.08
4 Ursæ Minoris (Bode) . .	105 55 0.00		89 1 49.00	
25 Camelopardali Hevelii . .	105 4 25.50		82 40 32.10	
156 Camelopardali (Bode) . .	115 24 0.00		84 27 39.00	
1 Draconis Hevelii	139 0 30.00		81 57 38.50	
30 Camelopardali Hevelii . .	153 14 51.00		83 17 32.50	
202 Camelopardali (Bode) . .	170 22 50.00	—0.75	81 55 29.10	
5 Ursæ Minoris (Bode) . .	183 0 50.42	+4.70	87 14 31.09	
6 Ursæ Minoris (Bode) . .	183 38 16.24	—1.75	88 30 5.72	
214 Camelopardali (Bode) . .	200 12 12.50	—1.30	85 30 45.00	
20 Ursæ Minoris (Bode) . .	211 17 0.00		86 27 5.00	+0.01
57 Ursæ Minoris (Bode) . .	231 30 0.00		87 46 50.00	
62 Ursæ Minoris (Bode) . .	239 42 0.00		83 22 42.00	
ε Ursæ Minoris	255 14 30.66	+0.15	82 16 6.56	
λ Ursæ Minoris (Bode) . . .	302 9 38.49	—1.17	88 52 31.29	
74 Draconis	309 24 14.64	+0.40	80 34 28.12	
119 Cephei (Bode)	321 14 53.97	+0.06	83 38 36.08	
34 Cephei Hevelii	341 58 45.22		82 22 58.20	
39 Cephei Hevelii	351 55 24.42	+1.15	86 30 26.79	
309 Cephei (Bode)	358 11 50.56	+0.25	85 53 56.80	

TABLE II.

4 URSÆ MINORIS (Bode). = Gr. 1119.

[sec δ' for 1815 = 61.2; for 1855 = 59.1.]

	$\Delta \alpha'$	$\Delta \alpha' \cos \delta'$	N	ω	$\Delta \delta'$	N	ω'
Gr. 1807					$-0''.22$	9	$\frac{1}{2}$
Str. 1815	$+9''.35$	$+0''.15$	15	1			
Schw. 1828	-22.85	-0.37	2	$\frac{1}{4}$	$+0.91$	2	$\frac{1}{4}$
Pond, 1830	$[-120.55]$		4		-0.36	10	$\frac{1}{2}$
Hend. 1839	$+1.25$	$+0.02$	10	1	-0.72	10	1
Rob. 1844	$+12.15$	$+0.20$	30	2	-0.44	11	1
Joh. 1849, 1850	$+6.95$	$+0.12$	70	3	-0.43	43	3
Airy, 1857	$+43.80$	$+0.73$	5	$\frac{1}{2}$	-0.50	5	$\frac{1}{2}$
Car. 1855	$+6.00$	$+0.10$	27	$1\frac{1}{2}$	-0.50	27	$1\frac{1}{2}$

1 URSÆ MINORIS (Bode).

[sec δ' for 1815 = 45.8; for 1855 = 51.0.]

Br. 1755	$0''.00$	$0''.00$	3	$\frac{1}{4}$	$0''.00$	3	$\frac{1}{4}$
Gr. 1807					$+0.84$	19	1
Str. 1815	$+19.02$	$+0.42$	4	$\frac{1}{2}$			
Schw. 1828	$+17.48$	$+0.36$	22	1	$+0.01$	12	1
Arg. 1830	$+10.80$	$+0.22$	17	1	$+0.14$	17	2
Pond, 1830	$+10.80$	$+0.22$	6	$\frac{1}{4}$	$+0.24$	10	$\frac{1}{2}$
Airy, 1840	-14.11	-0.28	25	2	$+0.03$	77	3
Rob. 1843, 1852	$+17.75$	$+0.36$	36	2	-0.42	5	1
Hend. 1840	-5.05	-0.10	26	2	-0.01	132	3
Joh. 1843, 1847	$+5.43$	$+0.11$	111	3	$+0.42$	158	3
Airy, 1844	-13.50	-0.27	15	1	$+0.14$	56	3
Airy, 1851	-9.97	-0.20	49	2	-0.10	106	3
Airy, 1857	-3.79	-0.07	63	3	$+0.16$	97	3
LeV. 1857	$+11.79$	$+0.23$	50	3	-0.25	59	3

6 URSÆ MINORIS (Bode). = Gr. 1884.

[sec δ' for 1815 = 45; for 1855 = 38.4.]

Br. 1752	$0''.00$	$0''.00$	4	$\frac{1}{4}$	$0''.00$	4	$\frac{1}{4}$
Gr. 1807					-0.47	6	$\frac{1}{2}$
Str. 1815	$+18.55$	$+0.41$	19	1			
Bessel, 1815					$+0.02$	24	1
Schw. 1828	$+24.04$	$+0.56$	11	$\frac{3}{4}$	$+0.26$	10	$\frac{3}{4}$
Arg. 1830	$+24.84$	$+0.58$	16	1	$+0.44$	10	1
Hend. 1839	$+42.09$	$+1.03$	10	1	-0.26	10	1
Airy, 1840	-23.98	-0.56	5	$\frac{1}{2}$			
Rob. 1839	$+26.02$	$+0.64$	59	3	-0.22	18	$1\frac{1}{2}$
Airy, 1842	$+8.53$	$+0.21$	4	$\frac{1}{2}$	$+0.91$	7	1
Joh. 1848	-11.54	-0.29	63	3	$+0.48$	67	3
Airy, 1851	-8.28	-0.21	3	$\frac{1}{2}$	-0.74	3	$\frac{1}{2}$
Car. 1855	-10.26	-0.27	15	1	$+0.52$	15	1

57 φ URSÆ MINORIS (Bode). = Gr. 2283.[sec δ' for 1815 = 27.4; for 1855 = 25.8.]

	$\Delta \alpha'$	$\Delta \alpha' \cos \delta'$	N	ω	$\Delta \delta'$	N	ω'
Gr. 1808					+1.58	8	$\frac{1}{2}$
Str. 1815	+11.17	+0.41	13	1			
Schw. 1828	+8.89	+0.33	5	$\frac{1}{2}$	+0.85	5	$\frac{1}{2}$
Hend. 1839	+13.18	+0.50	10	1	+0.14	10	1
Joh. 1850	-19.13	-0.73	47	3	-0.54	11	1
Airy, 1851	+6.75	+0.26	5	$\frac{1}{2}$	+0.40	4	$\frac{1}{2}$
Car. 1855	+4.50	+0.17	12	1	-0.60	12	1

5 URSÆ MINORIS (Bode). = Gr. 1871.

[sec δ' for 1815 = 22.6; for 1855 = 20.8.]

Br. 1751	0.00	0.00	2	$\frac{1}{5}$	-1.49	7	$\frac{1}{2}$
Gr. 1807							
Str. 1815	-8.37	-0.37	17	1			
Schw. 1828*	+4.57	+0.21	2	$\frac{1}{4}$	-0.78	2	$\frac{1}{4}$
Arg. 1830	+10.25	+0.47	19	$1\frac{1}{2}$	+0.61	19	2
Airy, 1840	+1.12	+0.05	6	$\frac{1}{2}$	-0.08	12	1
Joh. 1850	+1.15	+0.05	28	2	-0.43	8	1
Airy, 1851	+6.08	+0.29	4	$\frac{1}{2}$	-0.04	5	$\frac{1}{2}$
Car. 1855	+17.92	+0.86	5	$\frac{1}{2}$	-0.41	5	$\frac{1}{2}$

51 CEPHEI HEVELII.

[sec δ' for 1815 = 21.0; for 1855 = 20.9.]

Gr. 1807					-1.48	11	$\frac{1}{2}$
Str. 1815	-6.57	-0.31	14	1			
Schw. 1828	-7.24	-0.35	17	1	-0.63	14	1
Pond, 1830†	-2.37	-0.11	23	1	+0.70	20	1
Hend. 1842	+6.20	+0.30	29	2	-0.31	108	3
Airy, 1840	+7.67	+0.37	17	1	+0.49	78	3
Airy, 1843	+16.47	+0.78	33	2	-0.30	40	2
Joh. 1847	-0.42	-0.02	157	3	-0.37	122	3
Airy, 1850	+8.08	+0.39	50	2	+0.28	66	$2\frac{1}{2}$
Airy, 1857	+10.67	+0.51	100	3	+0.56	185	3
LeV. 1857	-18.54	-0.88	3	$\frac{1}{4}$	+1.46	1	
Car. 1855	+5.70	+0.27	28	2	+0.28	28	2

20 URSÆ MINORIS (Bode). = Gr. 2099.

[sec δ' for 1815 = 17.0; for 1855 = 16.1.]

Gr.					+0.72	5	$\frac{1}{2}$
Str. 1815	-10.54	-0.62	12	1			
Schw. 1828*	-8.33	-0.50	3	$\frac{1}{3}$	+1.62	3	$\frac{1}{3}$
Joh. 1850, 1852 . .	-2.43	-0.15	20	2	-0.21	7	$\frac{1}{2}$
Car. 1855	+25.50	+1.59	4	$\frac{1}{2}$	-2.20	4	$\frac{1}{2}$

* See Carrington.

† Declination derived from observations of 1833 alone. Those of 1831, which differ in the mean 3''.11 from those of 1833, are excluded.

39 CEPHEI HEVELII.

[sec δ' for 1815 = 15.4; for 1855 = 16.4.]

	$\Delta \alpha'$	$\Delta \alpha' \cos \delta'$	N	ω	$\Delta \delta'$	N	ω'
Br. 1755	0.00	0.00	4	$\frac{1}{4}$	0.00	5	$\frac{1}{4}$
Gr. 1808					+1.71	6	$\frac{1}{2}$
Str. 1815	+21.53	+1.40	3	$\frac{1}{5}$			
Schw. 1828	+1.48	+0.09	7	$\frac{1}{2}$	+0.12	6	$\frac{1}{2}$
Hend. 1839	+4.24	+0.26	11	1	-0.19	10	1
Airy, 1840	-12.68	-0.79	5	$\frac{1}{2}$			
Rob. 1839, 1842 . .	+18.49	+1.16	13	1	+0.55	5	$\frac{1}{2}$
Airy, 1842	-0.04	0.00	5	$\frac{1}{2}$	-0.55	5	$\frac{1}{2}$
Joh. 1850	+0.01	0.00	38	$2\frac{1}{2}$	+0.95	31	2
Airy, 1851, 1852 . .	-6.53	-0.40	5	$\frac{1}{2}$	+0.71	10	1
Car. 1855	-3.08	-0.19	21	2	-0.81	21	$\frac{1}{2}$

323 CEPHEI (Bode). = Gr. 642.

[sec δ' for 1815 = 14.4; for 1855 = 15.0.]

Gr. 1807					+0.23	6	$\frac{1}{2}$
Str. 1815	+25.68	+1.78	19	1			
Schw. 1828	-0.54	-0.04	8	$\frac{1}{2}$	-0.48	7	$\frac{3}{4}$
Airy, 1840							
Hend. 1839	+2.71	+0.18	10	1	-0.65	10	1
Airy, 1845	-6.54	-0.46	3	$\frac{1}{4}$	-0.43	5	$\frac{1}{2}$
Joh. 1845, 1850 . .	+8.39	+0.57	50	3	+0.39	14	$1\frac{1}{4}$
Airy, 1851	+4.35	+0.29	5	$\frac{1}{2}$	+0.34	4	$\frac{1}{2}$
Car. 1855	+1.00	+0.07	5	$\frac{1}{2}$	-0.50	5	$\frac{1}{2}$

43 CEPHEI HEVELII = 2 URSE MINORIS. = Gr. 177.

[sec δ' for 1815 = 12.1; for 1855 = 12.7.]

Br. 1755	0.00	0.00	8	$\frac{3}{8}$	0.00	5	$\frac{1}{2}$
Gr. 1807					+0.24	7	$\frac{1}{2}$
Str. 1815	+5.28	+0.42	6	$\frac{5}{8}$			
Bess. 1815					-0.45	28	1
Schw. 1828	+1.28	+0.10	3	$\frac{1}{4}$	-0.66	2	$\frac{1}{4}$
Pond, 1830	-3.78	-0.31	10	$\frac{1}{2}$	+0.52	12	$\frac{3}{8}$
Airy, 1837	-5.98	-0.48	5	$\frac{1}{2}$			
Hend. 1839	-2.83	-0.23	7	$\frac{3}{4}$	+0.01	16	$1\frac{1}{2}$
Rob. 1837, 1852 . .	+2.37	+0.19	8	$\frac{3}{4}$	+1.57	2	$\frac{1}{4}$
Airy, 1845					+0.66	7	$\frac{3}{4}$
Joh. 1849, 1851 . .	-1.60	-0.12	24	2	+0.65	12	1
Airy, 1851	-12.01	-0.95	4	$\frac{1}{2}$	-0.24	4	$\frac{1}{2}$
Car. 1855	-1.86	-0.15	3	$\frac{1}{4}$	-0.26	3	$\frac{1}{4}$

309 CEPHEI (Bode). = Gr. 4193.

[sec δ' for 1815 = 13.3; for 1855 = 14.0.]

	$\Delta \alpha'$	$\Delta \alpha' \cos \delta'$	N	ω	$\Delta \delta'$	N	ω'
Br. 1755	0.00	0.00	2	$\frac{1}{8}$	—0.34	6	$\frac{1}{2}$
Gr. 1808	+12.20	+0.91	3	$\frac{1}{4}$	—1.21	27	1
Str. 1815	+13.45	+1.00	2	$\frac{1}{4}$	+0.27	2	$\frac{1}{4}$
Bess. 1815	—0.87	—0.06	5	$\frac{1}{2}$	+1.10	5	$\frac{1}{2}$
Schw. 1828	—8.88	—0.64	29	2	+0.44	18	$1\frac{1}{2}$
Rob. 1844, 1846 . .	—11.62	—0.84	8	1	—0.03	10	1
Joh. 1849	—12.94	—0.92	4	$\frac{1}{2}$	—1.80	4	$\frac{1}{2}$
Airy, 1851							
Car. 1855							

214 CAMELOPARDALI (Bode). = Gr. 2007.

[sec δ' for 1815 = 13.4; for 1855 = 12.8.]

Gr. 1808	+3.51	+0.26	4	$\frac{1}{2}$	+0.86	6	$\frac{1}{2}$
Str. 1815	—1.17	—0.09	2	$\frac{1}{4}$	—1.32	2	$\frac{1}{4}$
Schw. 1828	+3.63	+0.28	10	1	—0.42	10	1
Hend. 1839					—0.59	5	$\frac{1}{2}$
Airy, 1845	—3.16	—0.24	29	$2\frac{1}{2}$	+1.40	22	2
Joh. 1849, 1850 . .	—1.51	—0.12	8	$\frac{3}{4}$	—0.62	7	$\frac{3}{4}$
Airy, 1850, 1851 .	+1.00	+0.08	3	$\frac{1}{4}$	—1.80	3	$\frac{1}{4}$
Car. 1855							

Gr. 750.

[sec δ' for 1815 = 11.6; for 1855 = 11.9.]

Gr. 1808	+3.12	+0.28	5	$\frac{1}{2}$	+1.66	6	$\frac{1}{2}$
Str. 1815	+1.75	+0.14	2	$\frac{1}{4}$	—0.62	2	$\frac{1}{4}$
Schw. 1828	—1.67	—0.14	11	$\frac{3}{4}$	+1.06	13	$\frac{3}{4}$
Pond. 1830	—2.52	—0.21	10	1	—0.47	10	1
Hend. 1839	+3.00	+0.25	43	3	—0.59	11	1
Joh. 1848, 1852 . .	—3.25	—0.27	5	$\frac{1}{2}$	+0.08	7	1
Airy, 1857	—5.30	—0.45	16	$1\frac{1}{2}$	—0.90	16	1
Car. 1855							

156 CAMELOPARDALI (Bode). = Gr. 1359.

[sec δ' for 1815 = 10.5; for 1855 = 10.4.]

Gr. 1808	+3.57	+0.34	3	$\frac{1}{4}$	+0.96	7	$\frac{1}{2}$
Str. 1815	+4.05	+0.39	7	$\frac{3}{4}$	+0.44	7	$\frac{3}{4}$
Schw. 1828	+14.26	+1.36	5	$\frac{3}{4}$			
Hend. 1844	+1.54	+0.15	38	$2\frac{1}{2}$	+0.50	23	2
Joh. 1850, 1848 . .	+7.09	+0.68	4	$\frac{1}{2}$	—0.11	3	$\frac{1}{4}$
Airy, 1844	—10.50	—1.01	3	$\frac{1}{4}$	—0.40	3	$\frac{1}{4}$
Carr. 1855							

64 CAMELOPARDALI (Bode). = Gr. 944.

[sec δ' for 1815 = 11.6; for 1855 = 11.7.]

	$\Delta \alpha'$	$\Delta \alpha' \cos \delta'$	N	ω	$\Delta \delta'$	N	ω'
Gr. 1807					+0".14	6	$\frac{1}{2}$
Str. 1815	+14".75	+1".27	8	$\frac{3}{4}$			
Schw. 1828	+0.53	+0.05	5	$\frac{1}{2}$	+1.02	5	$\frac{1}{2}$
Hend. 1839	+3.90	+0.33	10	1	-0.58	11	1
Rob. 1850, 1851 . .	-5.26	-0.47	2	$\frac{1}{4}$	+1.66	5	$\frac{1}{2}$
Joh. 1848, 1846 . .	-1.12	-0.10	33	$2\frac{1}{2}$	-0.09	18	$1\frac{1}{2}$
Airy, 1844	+5.18	+0.44	4	$\frac{1}{2}$	+0.02	5	$\frac{1}{2}$
Airy, 1851	+4.95	+0.42	3	$\frac{1}{2}$	-0.14	3	$\frac{1}{2}$
Car. 1855	0.00	0.00	14	$1\frac{1}{4}$	-0.70	14	1

119 CEPHEI (Bode).*

[sec δ' for 1815 = 8.8; for 1855 = 9.0.]

Br. 1755	0.00	0.00	2	$\frac{1}{8}$	0.00	1	$\frac{1}{8}$
Gr. 1808					+2.59	7	$\frac{1}{2}$
Str. 1815	+10.42	+1.18	1	$\frac{1}{8}$			
Schw. 1828	+5.58	+0.63	2	$\frac{1}{4}$	+0.57	2	$\frac{1}{4}$
Rob. 1846, 1849 . .	-7.22	-0.81	5	$\frac{1}{2}$	+0.13	5	$\frac{1}{2}$
Joh. 1851, 1848 . .	-1.31	-0.15	5	$\frac{1}{2}$	+0.65	3	$\frac{1}{2}$
Car. 1855	-6.03	-0.67	3	$\frac{1}{4}$	-1.52	3	$\frac{1}{4}$

2315 Groombr. = 62 URSAE MINORIS (B).

[sec δ' for 1815 = 8.8; for 1855 = 8.7.]

Gr. 1807					+0".74	6	$\frac{1}{2}$
Str. 1815	+1".64	+0".19	6	$\frac{1}{2}$			
Schw. 1828	+13.48	+1.55	2	$\frac{1}{4}$	-0.31	2	$\frac{1}{4}$
Airy, 1847					+1.43	2	$\frac{1}{2}$
Joh. 1851, 1850 . .	-3.18	-0.37	4	$\frac{1}{2}$	+0.68	6	$\frac{1}{2}$
Airy, 1850	-4.75	-0.55	2	$\frac{1}{4}$			
Car. 1855	-6.00	-0.69	3	$\frac{1}{4}$	-1.10	3	$\frac{1}{4}$

30 CAMELOPARDALI HEVELII. = Gr. 1633 = P. X. 22.

[sec δ' for 1855 = 8.8; for 1855 = 8.6.]

Gr. 1807					+0".34	6	$\frac{1}{2}$
Str. 1815	-13.31	-1.51	2	$\frac{1}{4}$			
Schw. 1828	+8.89	+1.01	4	$\frac{1}{2}$	+0.83	4	$\frac{1}{2}$
Rob. 1844 1854 . .	+15.86	+1.83	5	$\frac{1}{2}$	+0.85	5	$\frac{1}{2}$
Joh. 1845	+8.45	+0.98	7	$\frac{3}{4}$	+0.52	6	$\frac{3}{4}$
Airy, 1847					-0.64	9	1
Airy, 1850	+13.24	+1.54	9	1	+0.17	20	2
Car. 1855	+18.00	+2.09	3	$\frac{1}{4}$	-1.10	3	$\frac{1}{4}$

* 13".2, or one division, has been subtracted from the declination in the *Fundamenta Astronomiae*. The correction seems necessary.

25 CAMELOPARDALI HEVELII. = Gr. 1259.

[sec δ' for 1815 = 7.9; for 1855 = 7.84.]

	$\Delta \alpha'$	$\Delta \alpha' \cos \delta'$	N	ω	$\Delta \delta'$	N	ω'
Gr. 1808	— 0.59	—0.07	3	$\frac{1}{4}$	—0.54	6	$\frac{1}{2}$
Str. 1815	+ 0.31	+0.04	14	$1\frac{1}{2}$	—0.21	14	1
Str. 1824	— 0.24	—0.03	19	$1\frac{1}{4}$	+0.08	17	$1\frac{1}{2}$
Schw. 1828	—10.65	—1.36	10	$\frac{3}{4}$	+0.10	11	$\frac{3}{4}$
Pond, 1830	— 0.80	—0.10	5	$\frac{1}{2}$	—0.18	16	$1\frac{1}{2}$
Airy, 1840	— 7.85	—1.00	2	$\frac{1}{4}$	+2.28	5	$\frac{1}{2}$
Rob. 1831, 1852 . .	+ 5.19	+0.66	4	$\frac{1}{2}$	—0.13	3	$\frac{1}{4}$
Airy, 1844	— 9.52	—1.22	5	$\frac{1}{2}$	+0.98	7	$\frac{1}{4}$
Joh. 1843					—0.63	5	$\frac{1}{2}$
Airy, 1849	—12.00	—1.53	3	$\frac{1}{2}$	0.00	3	$\frac{1}{4}$
Car. 1855					+1.41	2	$\frac{1}{4}$
Airy, 1858							

34 CEPHEI HEVELII.

[sec δ' for 1815 = 7.34; for 1855 = 7.55.]

Br. 1755	0.00	0.00	1	$\frac{1}{8}$	0.00	3	$\frac{1}{4}$
Gr. 1808					+0.53	6	$\frac{1}{2}$
Str. 1815	+14.68	+2.00	1	$\frac{1}{4}$	—0.26	8	$\frac{3}{4}$
Schw. 1828	+ 5.52	+0.74	9	$\frac{1}{2}$	—0.04	10	1
Rob. 1842, 1843 . .	— 1.51	—0.20	10	1	—0.36	3	$\frac{2}{5}$
Airy, 1839	— 6.01	—0.81	6	$\frac{1}{2}$	+0.97	6	$\frac{1}{2}$
Airy, 1846					—1.50	3	$\frac{1}{4}$
Joh. 1847, 1844 . .	+ 1.34	+0.18	4	$\frac{1}{2}$			
Car. 1855	— 5.78	—0.77	3	$\frac{1}{4}$			

 ϵ URSAE MINORIS.[sec δ' for 1815 = 7.49; for 1855 = 7.43.]

Br. 1755	0.00	0.00	5	$\frac{1}{3}$	0.00	5	$\frac{1}{3}$
Gr. 1807					+0.36	16	1
Str. 1815	+ 2.71	+0.36	38	2	—0.19	15	2
Str. 1824	— 1.71	—0.23	15	2	—0.32	18	1
Schw. 1828	+ 2.58	+0.35	29	1	—0.19	12	$\frac{1}{2}$
Pond, 1830	+ 1.62	+0.22	9	$\frac{1}{2}$	+0.11	99	$\frac{1}{3}$
Hend. 1841	— 0.87	—0.12	19	$1\frac{1}{2}$	—0.21	102	3
Airy, 1840	— 4.84	—0.65	28	2	—0.11	4	$\frac{1}{2}$
Rob. 1828, 1836 . .	+18.78	+2.50	2	$\frac{1}{4}$			
Peters, 1840	— 4.09	—0.55		3			
Airy, 1845	— 8.19	—1.10	22	$1\frac{1}{2}$	+0.09	84	3
Joh. 1842, 1843 . .	+ 1.19	+0.16	19	$1\frac{1}{2}$	—0.11	24	3
Airy, 1851	— 3.96	—0.53	40	$2\frac{1}{2}$	—0.11	64	3
Car. 1855	— 0.84	—0.11	3	$\frac{1}{4}$	—1.14	3	$\frac{1}{4}$
Airy, 1857	+ 1.16	+0.16	45	$\frac{1}{3}$	+0.14	72	3
LeV. 1857	+ 5.43	+0.73	16	2	—0.28	38	2

202 CAMELOPARDALI (Bode).

[sec δ' for 1815 = 7.3 ; for 1855 = 7.1.]

	$\Delta \alpha'$	$\Delta \alpha' \cos \delta'$	N	ω	$\Delta \delta'$	N	ω'
Gr. 1807					+1.00	6	$\frac{1}{2}$
Str. 1815	+0.41	+0.06	3	$\frac{1}{3}$			
Schw. 1828	+5.13	+0.70	7	$\frac{2}{3}$	+0.05	5	$\frac{1}{2}$
Joh. 1844, 1846 . .	+3.53	+0.50	5	$\frac{1}{2}$	+0.78	5	$\frac{1}{2}$
Car. 1855	-1.00	-0.14	3	$\frac{1}{4}$	-1.00	3	$\frac{1}{4}$

1 DRACONIS HEVELII. = Gr. 1537.*

[sec δ' for 1815 = 7.3 ; for 1855 = 6.95.]

Gr. 1810					+0.38	6	$\frac{1}{2}$
Str. 1815	-1.90	-0.26	6	$\frac{3}{4}$			
Schw. 1828	-0.26	-0.04	57	$\frac{3}{3}$	+0.18	46	3
Pond, 1830	-6.50	-0.91	14	$\frac{3}{4}$	+0.57	20	1
Peters, 1840	-0.53	-0.08	16	2			
Airy, 1840	-4.88	-0.69	5	$\frac{1}{2}$	+0.16	20	2
Airy, 1845	-7.13	-1.01	6	$\frac{1}{2}$	+0.55	7	$\frac{3}{4}$
Joh. 1845, 1850 . .	-2.33	-0.33	5	$\frac{1}{2}$	-0.24	17	$\frac{1}{2}$
Airy, 1851	-0.23	-0.03	7	$\frac{3}{4}$	+0.09	1	$\frac{1}{4}$
Car. 1855	-10.50	-1.51	3	$\frac{1}{4}$	+0.30	3	$\frac{1}{4}$

Gr. 527.

[sec δ' for 1815 = 6.15 ; for 1855 = 6.26.]

Br. 1755	0.00	0.00	1	$\frac{1}{8}$			
Gr. 1807					+0.56	6	$\frac{1}{2}$
Str. 1815	-3.48	-0.57	11	1			
Schw. 1828	+1.38	+0.23	7	$\frac{3}{4}$	+0.14	7	$\frac{7}{10}$
Rob. 1853, 1850 . .	-0.82	-0.13	3	$\frac{3}{8}$	+0.42	5	$\frac{1}{2}$
Airy, 1841					-1.35	2	$\frac{3}{10}$
Airy, 1847	+12.56	+2.01	2	$\frac{1}{4}$			
Joh. 1844, 1846 . .	-0.60	-0.10	3	$\frac{1}{4}$	-0.31	5	$\frac{1}{2}$
Airy, 1849, 1850 . .	+4.17	+0.67	2	$\frac{1}{4}$	-0.27	9	1

74 DRACONIS.

[sec δ' for 1815 = 6.02 ; for 1855 = 6.11.]

Br. 1755	0.00	0.00	2	$\frac{1}{4}$	0.00	4	$\frac{8}{10}$
Gr. 1808					+0.99	6	$\frac{1}{2}$
Str.† 1815	[+19.59]	+0.76	1				
Bess. 1818	+2.41	+0.40	2	$\frac{1}{8}$			
Schw. 1828	+13.26	+2.19	3	$\frac{1}{4}$	+2.12	3	$\frac{3}{10}$
Arg. 1830	+7.06	+1.17	9	1	+1.76	9	1
Rob. 1853, 1842 . .	+2.33	+0.38	1	$\frac{1}{8}$	+3.58	7	$\frac{4}{5}$
Joh. 1850, 1846 . .	+11.71	+1.91	5	$\frac{1}{2}$	+3.50	7	$\frac{2}{5}$

* I have not been able to verify Robinson's declination from his observations.

† Probably one second of time in error (see Argelander).

TABLE III. PART 1.*

4 URSÆ MINORIS (Bode) = Gr. 1119.									
0 = + 0.2970	+	0.5950	<i>w</i>	—	0.2076	<i>x</i>	—	0.0284	<i>y</i> + 0.0181 <i>z</i>
0 = — 0.0520	—	0.2076	<i>w</i>	+	0.1674	<i>x</i>	+	0.0180	<i>y</i> — 0.0107 <i>z</i>
0 = — 3.5740	—	0.0284	<i>w</i>	+	0.0180	<i>x</i>	+	8.2660	<i>y</i> — 2.7550 <i>z</i>
0 = + 0.8430	+	0.0181	<i>w</i>	—	0.0107	<i>x</i>	—	2.7550	<i>y</i> + 2.3150 <i>z</i>
1 URSÆ MINORIS (Bode).									
0 = + 0.2000	+	1.8200	<i>w</i>	—	0.6210	<i>x</i>	—	0.0770	<i>y</i> + 0.0660 <i>z</i>
0 = — 0.1070	—	0.6210	<i>w</i>	+	0.6027	<i>x</i>	+	0.0650	<i>y</i> — 0.0880 <i>z</i>
0 = + 1.9550	—	0.0770	<i>w</i>	+	0.0650	<i>x</i>	+	24.4830	<i>y</i> — 8.6580 <i>z</i>
0 = — 2.1960	+	0.0660	<i>w</i>	—	0.0880	<i>x</i>	—	8.6580	<i>y</i> + 8.5800 <i>z</i>
57 φ URSÆ MINORIS (Bode) = Gr. 2283.									
0 = — 0.5390	+	2.3600	<i>w</i>	—	0.9560	<i>x</i>	+	0.0440	<i>y</i> — 0.0260 <i>z</i>
0 = — 0.2750	—	0.9560	<i>w</i>	+	0.8580	<i>x</i>	—	0.0260	<i>y</i> + 0.0270 <i>z</i>
0 = + 0.4250	+	0.0440	<i>w</i>	—	0.0260	<i>x</i>	+	4.5040	<i>y</i> — 2.0130 <i>z</i>
0 = — 1.6060	—	0.0260	<i>w</i>	+	0.0270	<i>x</i>	—	2.0130	<i>y</i> + 1.8700 <i>z</i>
51 CEPHEI HEVELII.									
0 = + 2.6900	+	9.3030	<i>w</i>	—	3.1160	<i>x</i>	+	0.0410	<i>y</i> — 0.0010 <i>z</i>
0 = + 0.2230	—	3.1160	<i>w</i>	+	2.2790	<i>x</i>	—	0.0040	<i>y</i> — 0.0130 <i>z</i>
0 = + 1.1060	+	0.0410	<i>w</i>	—	0.0040	<i>x</i>	+	21.0020	<i>y</i> — 6.9660 <i>z</i>
0 = + 1.2060	—	0.0010	<i>w</i>	—	0.0130	<i>x</i>	—	6.9660	<i>y</i> + 4.4620 <i>z</i>

TABLE III. PART 2.†

6 URSÆ MINORIS B.									
0 = + 2.99	+	12.50	<i>x</i>	—	7.02	<i>y</i>	<i>x</i> = — 0.089	0 = + 2.34	+ 11.50 <i>x'</i> — 7.20 <i>y'</i> <i>x'</i> = — 0.324
0 = — 2.63	—	7.02	<i>x</i>	+	7.51	<i>y</i>	<i>y</i> = + 0.268	0 = — 0.72	— 7.20 <i>x'</i> + 8.32 <i>y'</i> <i>y'</i> = — 0.194
5 URSÆ MINORIS B.									
0 = + 1.09	+	6.45	<i>x</i>	—	4.14	<i>y</i>	<i>x</i> = — 0.285	0 = — 0.45	+ 5.75 <i>x'</i> — 3.41 <i>y'</i> <i>x'</i> = — 0.007
0 = — 0.20	—	4.14	<i>x</i>	+	5.43	<i>y</i>	<i>y</i> = — 0.181	0 = + 0.41	— 3.41 <i>x'</i> + 3.00 <i>y'</i> <i>y'</i> = — 0.144
39 CEPHEI HEVELII.									
0 = + 0.83	+	9.00	<i>x</i>	—	3.63	<i>y</i>	<i>x</i> = + 0.004	0 = + 2.12	+ 7.75 <i>x'</i> — 3.46 <i>y'</i> <i>x'</i> = — 0.176
0 = — 1.04	—	3.63	<i>x</i>	+	4.48	<i>y</i>	<i>y</i> = + 0.234	0 = — 1.66	— 3.46 <i>x'</i> + 4.82 <i>y'</i> <i>y'</i> = + 0.219
20 URSÆ MINORIS B.									
0 = — 0.32	+	3.83	<i>x</i>	—	1.64	<i>y</i>	<i>x</i> = — 0.233	0 = — 0.36	+ 2.08 <i>x'</i> — 1.16 <i>y'</i> <i>x'</i> = + 1.05
0 = + 0.98	—	1.64	<i>x</i>	+	1.83	<i>y</i>	<i>y</i> = — 0.74	0 = — 1.01	— 1.16 <i>x'</i> + 1.41 <i>y'</i> <i>y'</i> = + 1.58
323 CEPHEI B.									
0 = + 3.73	+	6.75	<i>x</i>	—	2.97	<i>y</i>	<i>x</i> = — 0.174	0 = — 0.63	+ 5.00 <i>x'</i> — 2.63 <i>y'</i> <i>x'</i> = + 0.146
0 = — 2.73	—	2.97	<i>x</i>	+	2.58	<i>y</i>	<i>y</i> = + 0.86	0 = + 0.29	— 2.63 <i>x'</i> + 2.34 <i>y'</i> <i>y'</i> = + 0.039
309 CEPHEI B.									
0 = — 2.14	+	4.62	<i>x</i>	—	1.70	<i>y</i>	<i>x</i> = + 0.68	0 = — 1.03	+ 5.25 <i>x'</i> — 2.92 <i>y'</i> <i>x'</i> = — 0.116
0 = — 0.12	—	1.70	<i>x</i>	+	2.15	<i>y</i>	<i>y</i> = + 0.59	0 = + 1.53	— 2.92 <i>x'</i> + 3.33 <i>y'</i> <i>y'</i> = — 0.561

* In this portion of Table III. *w* denotes the correction in *time* of the assumed AR., and *x* 30 times the correction in *time* of the assumed annual proper motion; *y* in like manner denotes the correction in *space* of the assumed declination, and *z* 30 times the correction in *space* of its assumed annual proper motion; — all assumed values holding good for 1855.

† In this portion of Table III. *x* denotes the correction of the assumed right ascension for 1855, expressed in seconds of *space* and multiplied by the cosine of the declination; *y* denotes the correction of the assumed proper motion (for 1855) in AR., multiplied by 30 and by the cosine of the declination, — likewise, in *space*; *x'* and *y'* denote the same quantities as *y* and *z* in the first part of this table.

214 CAMELOPARDALI B.

$$\begin{array}{lll} 0 = -0.29 + 5.25x - 1.91y & x = +0.202 & 0 = +1.27 + 5.25x' - 2.24y' & x' = -0.238 \\ 0 = -0.20 - 1.91x + 1.45y & y = +0.404 & 0 = -0.55 - 2.24x' + 1.85y' & y' = +0.011 \end{array}$$

43 CEPHEI HEVELII. (2 URSAE MINORIS.)

$$\begin{array}{lll} 0 = -0.92 + 6.50x - 4.22y & x = +0.246 & 0 = +0.57 + 8.00x' - 6.24y' & x' = -0.27 \\ 0 = -0.01 - 4.22x + 6.53y & y = +0.160 & 0 = +0.53 - 6.24x' + 8.73y' & y' = -0.25 \end{array}$$

Gr. 750.

$$\begin{array}{lll} 0 = -0.20 + 7.50x - 2.02y & x = +0.085 & 0 = -0.41 + 5.50x' - 2.32y' & x' = +0.585 \\ 0 = -0.25 - 2.02x + 1.94y & y = +0.215 & 0 = -1.43 - 2.32x' + 2.29y' & y' = +1.203 \end{array}$$

64 CAMELOPARDALI B.

$$\begin{array}{lll} 0 = +1.38 + 7.25x - 2.83y & x = +0.139 & 0 = -0.13 + 6.00x' - 2.52y' & x' = +0.157 \\ 0 = -1.48 - 2.83x + 2.21y & y = +0.847 & 0 = -0.29 - 2.52x' + 2.14y' & y' = +0.319 \end{array}$$

156 CAMELOPARDALI B.

$$\begin{array}{lll} 0 = +1.83 + 5.00x - 1.83y & x = -0.21 & 0 = +1.65 + 3.75x' - 2.06y' & x' = -0.22 \\ 0 = -0.91 - 1.83x + 1.26y & y = +0.41 & 0 = -1.26 - 2.06x' + 2.01y' & y' = +0.40 \end{array}$$

30 CAMELOPARDALI H.

$$\begin{array}{lll} 0 = +3.68 + 3.25x - 1.37y & x = -1.92 & 0 = +0.82 + 5.50x' - 2.10y' & x' = -0.01 \\ 0 = -0.75 - 1.37x + 1.01y & y = -1.86 & 0 = -0.69 - 2.10x' + 1.86y' & y' = +0.36 \end{array}$$

119 CEPHEI B.

$$\begin{array}{lll} 0 = -0.37 + 1.75x - 1.02y & x = +0.38 & 0 = +1.44 + 2.12x' - 1.64y' & x' = -0.13 \\ 0 = -0.13 - 1.02x + 1.86y & y = +0.28 & 0 = -2.25 - 1.64x' + 2.88y' & y' = +0.71 \end{array}$$

62 URSAE MINORIS B.

$$\begin{array}{lll} 0 = -0.03 + 1.75x - 0.99y & x = +0.45 & 0 = +1.08 + 2.00x' - 1.23y' & x' = -0.43 \\ 0 = -0.40 - 0.99x + 1.11y & y = +0.76 & 0 = -0.79 - 1.23x' + 1.50y' & y' = +0.18 \end{array}$$

25 CAMELOPARDALI H.

$$\begin{array}{lll} 0 = -1.96 + 5.75x - 4.46y & x = +0.86 & 0 = +1.23 + 7.75x' - 5.09y' & x' = -0.77 \\ 0 = +1.14 - 4.46x + 4.02y & y = +0.67 & 0 = +0.45 - 5.09x' + 4.70y' & y' = -0.93 \end{array}$$

34 CEPHEI H.

$$\begin{array}{lll} 0 = +0.46 + 3.37x - 2.20y & x = +0.09 & 0 = +0.03 + 3.65x' - 3.00y' & x' = +0.10 \\ 0 = -0.73 - 2.20x + 2.67y & y = +0.34 & 0 = -0.33 - 3.00x' + 4.80y' & y' = +0.13 \end{array}$$

 ϵ URSAE MINORIS.

$$\begin{array}{lll} 0 = -2.91 + 23.33x - 11.69y & x = +0.16 & 0 = -1.60 + 25.58x' - 11.49y' & x' = +0.08 \\ 0 = +0.91 - 11.69x + 12.80y & y = +0.08 & 0 = +0.47 - 11.49x' + 12.00y' & y' = +0.04 \end{array}$$

202 CAMELOPARDALI B.

$$\begin{array}{lll} 0 = +0.72 + 1.75x - 1.22y & x = -0.29 & 0 = +0.66 + 1.75x' - 1.39y' & x' = +0.14 \\ 0 = -0.56 - 1.22x + 1.20y & y = +0.17 & 0 = -0.93 - 1.39x' + 1.71y' & y' = +0.66 \end{array}$$

1 DRACONIS H.

$$\begin{array}{lll} 0 = -2.45 + 9.00x - 6.01y & x = +0.48 & 0 = -0.28 + 9.25x' - 5.88y' & x' = -0.30 \\ 0 = +1.39 - 6.01x + 5.03y & y = +0.29 & 0 = +0.18 - 5.88x' + 5.02y' & y' = 0.00 \end{array}$$

Gr. 527.

$$\begin{array}{lll} 0 = +0.19 + 3.00x - 2.64y & x = -0.45 & 0 = -0.24 + 3.50x' - 1.96y' & x' = +0.35 \\ 0 = +0.47 - 2.64x + 3.77y & y = -0.44 & 0 = -0.31 - 1.96x' + 1.98y' & y' = +0.51 \end{array}$$

74 DRACONIS.

$$\begin{array}{lll} 0 = +2.99 + 2.62x - 2.64y & x = -1.71 & 0 = +7.75 + 3.50x' - 3.41y' & x' = -3.42 \\ 0 = -1.86 - 2.64x + 4.72y & y = -0.56 & 0 = -4.71 - 3.41x' + 5.61y' & y' = -1.24 \end{array}$$

TABLE IV.

5 URSAE MINORIS B.									
	AR.	log <i>a</i>	log <i>b</i>	log <i>c</i>	log <i>d</i>	μ	ν	Dec.	μ' Mag.
	^h ^m ^s					^s	^s		
1855	12 12 34.30	0.1904	0.1404 _n	0.1409 _n	8.8806 _n	+0.306	+0.001	87 14' 31".08	—0.005 6
1865	12 52.79	0.1886	0.1317 _n	0.1322 _n	8.8824 _n	+0.300	+0.001	11 10.79	
6 URSAE MINORIS B.									
1855	12 14 21.19	*	0.4061 _n	0.4062 _n	9.2035 _n	—0.094	—0.007	88 30 13.40	+0.074 6
1865	14 19.56		0.3903 _n	0.3904 _n	9.1869 _n	—0.091	—0.006	26 53.97	
43 CEPHEI HEVELII.									
1855	0 49 42.98	0.8267	9.9154	9.9167	9.2599	+0.068	—0.006	85 28 35.97	—0.001 4.5
1865	50 51.40	0.8349	9.9202	9.9215	9.2749	+0.068	—0.006	31 51.70	
POLARIS † (from Wolfers).									
1860	1 8 2.65							88 33 47.12	2
1865	9 38.10							35 22.91	
1870	11 16.92							36 58.48	
214 CAMELOPARDALI B.									
1855	13 20 40.34	0.4474 _n	9.9017 _n	9.9030 _n	9.4680 _n	—0.075	—0.005	85 30 44.76	0.000 7.8
1865	20 12.08	0.4315 _n	9.8969 _n	9.8982 _n	9.4605 _n	—0.074	—0.005	27 36.43	
20 URSAE MINORIS B. = Gr. 2099.									
1855	14 5 7.75	0.9098 _n	9.9632 _n	9.9641 _n	9.7477 _n	—0.027	—0.013	86 27 6.05	+0.053 7.8
1865	3 47.52	0.8959 _n	9.9590 _n	9.9598 _n	9.7577 _n	—0.027	—0.012	24 14.87	
Gr. 527.									
1855	2 27 12.90	0.9048	9.5192	9.5248	9.3989	+0.021	—0.003	80 49 37.44	—0.083 6
1865	28 33.75	0.9083	9.5194	9.5249	9.4043	+0.020	—0.003	52 16.84	
323 CEPHEI B.									
1855	3 19 28.49	1.2642	9.8083	9.8093	9.8835	+0.162	—0.016	86 10 40.45	—0.049 6
1865	22 35.44	1.2717	9.8053	9.8062	9.8924	+0.164	—0.016	12 48.17	
57 URSAE MINORIS B.									
1855	15 26 0.64	1.3789 _n	0.0297 _n	0.0300 _n	0.1295 _n	+0.034	—0.040	87 46 50.55	+0.048 7
1865	22 5.61	1.3642 _n	0.0319 _n	0.0322 _n	0.1165 _n	+0.032	—0.039	44 44.85	
Gr. 750.									
1855	3 52 24.81	1.2171	9.6195	9.6211	9.8270	+0.006	—0.009	85 9 52.18	+0.040 7
1865	55 10.61	1.2220	9.6136	9.6152	9.8329	+0.006	—0.009	11 37.53	

* *a* (number) —0°.1314 for 1855, —0°.0107 for 1865.† Apparent Places from the *Berliner Astronomisches Jahrbuch*.

62 URSAE MINORIS B.

	AR.	log <i>a</i>	log <i>b</i>	log <i>c</i>	log <i>d</i>	μ	ν	Dec.	μ'	Mag.
1855	^h 15 ^m 58 ^s 48.26	0.8371 _n	9.4620 _n	9.4649 _n	9.6982 _n	+0.015 ^s	—0.004 ^s	83° 22' 41.57"	+0.006	7.8
1865	57 40.04	0.8326 _n	9.4638 _n	9.4667 _n	9.6951 _n	+0.015	—0.004	21 0.01		

 ϵ URSAE MINORIS.

1855	17 0 59.13	0.8097 _n	9.0971 _n	9.1011 _n	9.6805 _n	+0.011	—0.001	82 16 6.64	+0.001	4.5
1865	16 59 54.87	0.8076 _n	9.1039 _n	9.1079 _n	9.6792 _n	+0.011	—0.001	15 15.13		

64 CAMELOPARDALI B.

1855	5 15 59.31	1.2649	*	*	9.8849	+0.022	—0.004	85 6 24.46	+0.011	6
1865	19 3.91	1.2665			9.8869	+0.022	—0.003	7 1.52		

 δ URSAE MINORIS.†

1860	18 17 30.16							86 36 6.24		4.5
1865	15 53.34							36 13.63		
1870	14 16.41							36 20.33		

51 CEPHEI HEVELII.

1855	6 31 6.40	1.4868	‡	‡	0.1392	—0.031	+0.008	87 15 8.70	—0.024	5
1865	36 12.01	1.4843			0.1365	—0.031	+0.009	14 39.12		

25 CAMELOPARDALI HEVELII.

1855	7 0 18.15	1.1178	9.1300 _n	9.1336 _n	9.7032	+0.012	+0.002	82 40 31.33	—0.031	5
1865	2 29.19	1.1162	9.1442 _n	9.1478 _n	9.7012	+0.011	+0.002	39 37.93		

4 URSAE MINORIS B.

1855	7 3 39.32	1.8979	0.0335 _n	0.0335 _n	0.5785	—0.019	+0.120	89 1 49.52	+0.008	7
1865	16 36.81	1.8833	0.1040 _n	0.1040 _n	0.5633	—0.017	+0.140	0 49.16		
1861		1.8893	0.0781 _n	0.0781 _n	0.5696	—0.018	+0.132			
1862		1.8879	0.0848 _n	0.0848 _n	0.5681	—0.018	+0.134			
1863		1.8864	0.0913 _n	0.0913 _n	0.5665	—0.018	+0.136			
1864		1.8848	0.0977 _n	0.0977 _n	0.5649	—0.017	+0.138			

156 CAMELOPARDALI B.

1855	7 41 35.85	1.1911	9.4696 _n	9.4716 _n	9.7951	+0.009	—0.005	84 27 38.78	+0.013	6
1865	44 10.61	1.1876	9.4778 _n	9.4799 _n	9.7909	+0.009	—0.005	26 11.81		

* *b* (number) +.1486 for 1855; +.1386 for 1865. Log *c* — Log *b* = +.0016.

† Apparent Places from the *Berliner Astronomisches Jahrbuch*.

‡ *b* (number) —.1880 for 1855; —.2179 for 1865. Log *c* — Log *b* = +.0005.

λ URSÆ MINORIS B.

	AR.	log α	log b	log c	log d	μ	ν	Dec.	μ'	Mag.
1855	20 ^h 8 ^m 30.70 ^s	1.7374 n	0.2568	0.2569	0.4590 n	—0.073 ^s	+0.148 ^s	88° 52' 32.31"	+0.015	6.7
1865	19 59 8.86	1.7604 n	0.2386	0.2386	0.4808 n	—0.077	+0.151	54 15.64		
1861		1.7512 n	0.2461	0.2462	0.4721 n	—0.075	+0.150			
1862		1.7535 n	0.2443	0.2444	0.4743 n	—0.076	+0.150			
1863		1.7558 n	0.2424	0.2425	0.4765 n	—0.076	+0.150			
1864		1.7581 n	0.2405	0.2405	0.4786 n	—0.077	+0.151			

74 DRACONIS.

1855	20 37 38.95	0.4990 n	9.4068	9.4127	9.4979 n	+0.019	+0.002	80 34 50.70	+0.217	6.7
1865	37 7.40	0.5038 n	9.4073	9.4131	9.5004 n	+0.019	+0.002	37 0.01		

1 DRACONIS HEVELII.

1855	9 16 2.23	0.9676	9.5518 n	9.5561 n	9.4951	+0.005	+0.004	81 57 38.20	0.000	4.5
1865	17 34.69	0.9638	9.5520 n	9.5563 n	9.4895	+0.005	+0.004	55 6.36		

30 CAMELOPARDALI HEVELII.

1855	10 12 58.30	0.9133	9.7043 n	9.7073 n	9.4099	—0.036	+0.005	83 17 32.49	+0.012	5
1865	14 19.36	0.9081	9.7023 n	9.7054 n	9.4016	—0.036	+0.005	14 33.26		

119 CEPHEI (Bode).

1855	21 25 0.23	0.6473 n	9.6690	9.6716	9.5761 n	+0.010	+0.004	83 38 31.95	—0.016	7
1865	24 15.52	0.6552 n	9.6708	9.6735	9.5808 n	+0.010	+0.004	41 7.98		

34 CEPHEI HEVELII.

1855	22 47 55.06	*	9.6759	9.6797	9.1920 n	+0.006	+0.001	82 23 3.30	+0.054	5
1865	47 54.79		9.6790	9.6828	9.1951 n	+0.006	+0.001	26 14.56		

202 CAMELOPARDALI (Bode).

1855	11 21 26.20	0.6675	9.6658 n	9.6701 n	8.9003	—0.047	+0.002	81 55 29.24	+0.022	6
1865	22 12.02	0.6635	9.6631 n	9.6675 n	8.8887	—0.047	+0.002	52 11.68		

39 CEPHEI HEVELII.

1855	23 27 49.30	†	0.0340	0.0349	9.1851 n	+0.085	+0.002	86 30 26.61	+0.007	6
1865	27 49.98		0.0410	0.0418	9.1919 n	+0.086	+0.002	33 45.27		

309 CEPHEI (Bode).

1855	23 52 49.67	0.3959	9.9682	9.9693	8.4649 n	+0.035	—0.001	85 53 56.68	—0.019	7
1865	53 15.04	0.4006	9.9742	9.9752	8.4444 n	+0.035	—0.001	57 16.96		

* α (number) —0°.0215 for 1855; —0°.0435 for 1865.† α (number) +0°.0061 for 1855; —0°.0418 for 1865.

TABLE V.

Assumed AR. 1855.		Deviation.			Assumed AR. 1855.		Deviation.		
12 Ceti,	^h 0 ^m 22 ^s 38.34	H. Ai. LeV. Ai.	+39 +21	+56 +48	β Arietis,	^h 1 ^m 46 ^s 38.21	H. Ai. LeV. Ai.	+64 +32 +51	+81 +88 +78
		1853 1855		+52 +53			1854 1855		+82 +83
β Ceti,	0 36 18.53	H. Ai. LeV. Ai.	-36 +28 +12 - 4	+ 8 +45 +68 +23	67 Ceti,	2 9 45.20	H. Ai. LeV. Ai.	-59 -25	-42 + 2
		1850 1855		+36 +38			1853 1855		-22 -22
ϵ Piscium,	0 55 25.27	H. Ai. LeV. Ai.	+16 -80 -13	+33 -24 +14	ξ^2 Ceti,	2 20 27.25	H. Ai. LeV. Ai.	+ 2 -54 - 8	+19 + 2 +19
		1854 1855		+ 8 + 8			1854 1855		+13 +13
θ Ceti,	1 16 46.56	H. Ai. LeV. Ai.	-37 +31 +10 - 8	+ 7 +48 +66 +19	γ Ceti,	2 35 47.45	H. Ai. LeV. Ai.	-44 +20 -19 + 6	0 +37 +37 +33
		1850 1855		+35 +37			1850 1855		+27 +28
η Piscium,	1 23 43.82	H. Ai. LeV. Ai.	-56 -66 - 5	-39 -10 +22	δ Arietis,	3 3 20.66	H. Ai. LeV. Ai.	+11 -45 +11	+28 +11 +38
		1854 1855		- 9 - 9			1854 1855		+26 +26
ν Piscium,	1 33 53.34 [wt. = $\frac{1}{2}$]	H. Ai. LeV. Ai.	-21 +30 -25	- 4 +86 + 2	η Tauri,	3 38 52.34	H. Ai. LeV. Ai.	-53 -22 -73 + 4	- 9 - 5 -17 +31
		1854 1855		+16 +16			1850 1855		0 0

Assumed AR. 1855.		Deviation.			Assumed AR. 1855.		Deviation.		
γ Eridani,	$\begin{smallmatrix} h & m & s \\ 3 & 51 & 15.94 \end{smallmatrix}$ [wt. = $\frac{1}{2}$]	H. Ai. LeV. Ai.	—15 +21 +50 — 6	+ 29 + 38 +106 + 21	α Leporis,	$\begin{smallmatrix} h & m & s \\ 5 & 26 & 20.20 \end{smallmatrix}$ [wt. = $\frac{1}{2}$] [wt. = $\frac{1}{2}$]	H. Ai. LeV. Ai.	—12 + 5 —57 —55	+ 5 — 1 —28
		1850 1855		+ 40 + 42			1853 1855		— 5 — 5
$\circ$ Eridani,*	4 4 47.37	H. Ai. LeV. Ai.	+31 —15	+48 +12	ε Orionis,	5 28 51.42	H. Ai. LeV. Ai.	— 5 +25 —13 —22	+39 +42 +43 + 5
		1853 1855		+30 +31			1850 1855		+32 +34
ε Tauri,	4 20 9.26	H. Ai. LeV. Ai.	+ 4 — 6 — 2	+21 50 25	ν Orionis,*	5 59 17.56	H. Ai. LeV. Ai.	+53 +32	+109 + 59
		1854 1855		+32 +32			1859 1855		+ 84 + 81
ι Aurigæ,	4 47 33.42	H. Ai. LeV. Ai.	—13 —91 — 7	+ 4 —35 +20	μ Geminor.	6 14 11.34	H. Ai. LeV. Ai.	—31 —25 —97 —48	+13 — 8 —41 —21
		1854 1855		— 4 — 4			1850 1855		—14 —15
ε Leporis,*	4 59 19.43	H. Ai. LeV. Ai.	+ 7 0	+24 +27	γ Geminor.	6 29 20.15	H. Ai. LeV. Ai.	—29 —70 —72	—12 —14 —45
		1853 1855		+25 +26			1854 1855		—24 —24
δ Orionis,	5 24 36.03	H. Ai. LeV. Ai.	—14 + 7 —41 —19	+30 +24 +15 + 8	ε Canis Maj.	6 52 55.68	H. Ai. LeV. Ai.	+29 —16 0	+46 +40 +27
		1850 1855		+19 +20			1854 1855		+38 +38

* The Greenwich observations for 1859–60, and those made at Paris in 1858–59, were included.

Assumed AR. 1855.		Deviation.			Assumed AR. 1855.		Deviation.		
γ Canis Maj.	^h 6 ^m 57 ^s 11.92	H. Ai. LeV. Ai.	+ 9 + 2	+26 +29	ι Ursæ Maj.	^h 8 ^m 49 ^s 15.67	H. Ai. LeV. Ai.	— 66 —100 — 59 — 45	—22 —83 — 3 —18
		1853 1855		+27 +28			1850 1855		—31 —33
δ Geminorum,	7 11 27.68	H. Ai. LeV. Ai.	— 91 — 54 —152 — 73	—47 —37 —96 —46	83 Cancrī,	9 10 53.01	H. Ai. LeV. Ai.	—22 —22	— 5 + 5
		1850 1855		—56 —59			1853 1855		0 0
χ Geminorum, [6 Cancrī,]	7 54 36.38	H. Ai. LeV. Ai.	+86 +5	+103 +32	δ Ursæ Maj.	9 23 8.06	H. Ai. LeV. Ai.	—103 — 18 — 4	—59 — 1 +23
		1853 1855		+32 +33			1848 1855		—12 —13
ι Navis, [15 Argus,]	8 1 22.17	H. Ai. LeV. Ai.	+13 —20 +15	+30 +36 +42	ϵ Leonis,	9 37 36.82	H. Ai. LeV. Ai.	—85 — 9 —66 +10	—41 + 8 —10 +37
		1854 1855		+36 +36			1850 1855		— 2 — 2
η Cancrī,	8 24 19.06	H. Ai. LeV. Ai.	+ 8 +11	+25 +38	π Leonis,	9 52 32.88	H. Ai. LeV. Ai.	—29 — 2 + 4	—12 +54 +31
		1853 1855		+31 +32			1854 1855		+24 +24
ϵ Hydræ,	8 39 5.66	H. Ai. LeV. Ai.	—31 +14 — 3 — 7	+13 +31 +53 +20	γ Leonis, preceding,	10 11 58.54*	H. Ai. LeV. Ai.	—156 —223 —175	—139 —167 —148
		1850 1855		+29 +31			1854 1855		—151 —152

* The value for the mean of the two stars was used as an assumed AR. The Greenwich observations for 1859 were included.

Assumed AR. 1855.		Deviation.			Assumed AR. 1855.		Deviation.		
ρ Leonis,	^h 10 ^m 25 ^s 10.40	H. Ai. LeV. Ai. 1854 1855	+17 -27 - 6	+34 +29 +21 +28 +28	ϵ Corvi,*	^h 12 ^m 2 ^s 40.41	H. Ai. LeV. Ai. 1853 1855	-13 +21	+ 4 +48 +26 +26
ι Leonis,	10 41 37.97	H. Ai. LeV. Ai. 1853 1855	-25 -20	- 8 + 7 0 0	η Virginis,	12 12 29.29	H. Ai. LeV. Ai. 1854	- 9 +11 +30	+ 8 +67 +57 +44
χ Leonis,	10 57 32.13	H. Ai. LeV. Ai. 1854 1855	+ 9 -42 -19	+26 +14 + 8 +16 +16	β Corvi,	12 26 46.65	H. Ai. LeV. Ai. 1854 1855	+69 +24 +48	+86 +80 +75 +81 +82
δ Leonis,	11 6 23.49	H. Ai. LeV. Ai. 1850 1855	+17 +25 -42 + 3	+61 +42 +14 +30 +37 +39	γ Virginis,* [mean of two stars,]	12 34 18.90	H. Ai. LeV. Ai. 1857 1855	- 2	+25 +25 +25
δ Crateris,	11 12 5.63	H. Ai. LeV. Ai. 1850 1855	-13 +51 -24 +21	+31 +68 +32 +48 +45 +47	12 Canum,*	12 49 14.36	H. Ai. LeV. Ai. 1850 1855	-61 -41 -95 -16	-17 -24 -39 +11 -17 -18
ν Leonis,	11 29 31.51	H. Ai. LeV. Ai. 1854 1855	+ 6 -28 -12	+23 +28 +15 +22 +22	θ Virginis,*	13 2 26.76	H. Ai. LeV. Ai. 1854 1855	-17 -21 -17	0 +35 +10 +15 +15

* Observations made at Greenwich in 1859 included.

Assumed AR. 1855.		Deviation.			Assumed AR. 1855.		Deviation.		
ζ Virginis,	^h ^m ^s 13 27 18.44	H.			β Libræ,	^h ^m ^s 15 9 12.58	H.	—52	— 8
		Ai.	+18	+35			Ai.	—32	—15
		LeV.	—37	+19			LeV.	—60	— 4
		Ai.	+17	+44			Ai.	—35	— 8
		1854		+33			1850		— 9
		1855		+33			1855		— 9
η Boötis,	13 47 46.84	H.	— 9	+35	β Scorpii,	15 57 0.78	H.	—103	—59
		Ai.	+22	+39			Ai.	— 79	—62
		LeV.	—28	+28			LeV.	— 96	—40
		Ai.	+ 2	+29			Ai.	— 65	—38
		1850		+33			1850		—50
		1855		+35			1855		—52
τ Virginis,	13 54 16.20	H.			δ Ophiuchi,	16 6 45.01	H.	—59	—15
		Ai.	—44	—27			Ai.	+16	+33
		LeV.	—42	+14			LeV.	+ 3	+59
		Ai.	—19	+ 8			Ai.	+ 1	+28
		1850		— 2			1850		+26
		1855		— 2			1855		+27
ϱ Boötis,	14 25 34.87	H.			ζ Herculis,	16 35 49.28 [wt. = $\frac{1}{2}$]	H.		
		Ai.	—39	—22			Ai.	— 41	—24
		LeV.					LeV.	—121	—65
		Ai.	—21	+ 6			Ai.	— 37	—10
		1853		— 8			1854		—27
		1855		— 8			1855		—27
ς Boötis, following,	14 38 39.30	H.	—48	— 4	κ Ophiuchi,	16 50 48.40	H.		
		Ai.	0	+17			Ai.	+19	+36
		LeV.	—73	—17			LeV.	—17	+39
		Ai.	+ 2	+29			Ai.	— 4	+23
		1850		+ 6			1854		+33
		1855		+ 7			1855		+33
ψ Boötis,	14 58 14.02	H.			θ Ophiuchi,	17 13 6.49	H.		
		Ai.	+12	+29			Ai.	—26	— 9
		LeV.					LeV.	—57	— 1
		Ai.	—18	+ 9			Ai.	+10	+37
		1853		+19			1854		+ 9
		1855		+19			1855		+ 9

Assumed AR. 1855.		Deviation.			Assumed AR. 1855.		Deviation.		
β Draconis,	$\begin{smallmatrix} h & m & s \\ 17 & 27 & 9.58 \\ [wt. = \frac{1}{2}] \\ [wt. = \frac{1}{2}] \end{smallmatrix}$	Ai.	— 64	— 47	δ Aquilæ,	$\begin{smallmatrix} h & m & s \\ 19 & 18 & 11.18 \end{smallmatrix}$	H.	— 6	+38
		H.	— 37	+ 7			Ai.	+32	+49
		LeV.	—167	—111			LeV.	+22	+78
		Ai.	+ 4	+ 31			Ai.	+12	+39
		1850		— 23			1850		+51
		1855		— 24			1855		+53
μ Herculis,	$\begin{smallmatrix} 17 & 40 & 47.18 \\ [wt. = \frac{1}{2}] \end{smallmatrix}$	H.			h^2 Sagittarii,*	$19 \ 27 \ 52.83$	H.		
		Ai.	—46	—29			Ai.		
		LeV.	—87	—31			LeV.	—59	— 3
		Ai.	—34	— 7			Ai.	—92	—65
		1854		—21			1856		—34
		1855		—21			1855		—34
μ^1 Sagittarii,	$18 \ 5 \ 5.52$	H.			ϱ Capricorni,	$20 \ 20 \ 35.23$	H.		
		Ai.	— 6	+11		(4 obs.)	Ai.	—136	—119
		LeV.	+21	+77		(2 obs.)	LeV.	+ 53	+ 3
		Ai.	+ 5	+32		(13 obs.)	Ai.	—105	— 78
		1854		+40			1855		— 78
		1855		+40					
β Lyræ,	$18 \ 44 \ 43.65$	H.	— 55	—11	32 Vulpeculæ,	$20 \ 48 \ 22.87$	H.		
		Ai.	— 26	— 9			Ai.	0	+17
		LeV.	—106	—50			LeV.	—53	+ 3
		Ai.	+ 19	+46			Ai.	+44	+71
		1850		— 6			1854		+30
		1855		— 6			1855		+31
ζ Aquilæ,	$18 \ 58 \ 44.77$	H.	—123	—79	61 Cygni,	$21 \ 0 \ 24.75$	H.	—85	—41
		Ai.	— 24	— 7	[mean of two		Ai.	+ 2	+15
		LeV.	— 59	— 3	stars,]		LeV.	—28	+28
		Ai.	0	+27			Ai.	+66	+93
		1850		—15			1850		+24
		1855		—16			1855		+25
ω Aquilæ,	$\begin{smallmatrix} 19 & 11 & 0.63 \\ [wt. = \frac{1}{2}] \end{smallmatrix}$	H.			ζ Cygni,	$21 \ 6 \ 46.03$	H.	—77	—33
		Ai.	—37	—20			Ai.	—19	— 2
		LeV.	—49	+ 7			LeV.	—55	+ 1
		Ai.	— 4	+23			Ai.	— 6	+21
		1854		+ 3			1850		— 3
		1854		+ 3			1855		— 3

* Greenwich observations of 1859 included.

Assumed AR. 1855.		Deviation.			Assumed AR. 1855.		Deviation.		
β Aquarii,	^h 21 ^m 23 ^s 55.35	H. Ai. LeV. Ai.	—13 +11 0 — 8	+31 +28 +56 +19	ζ Pegasi,	^h 22 ^m 34 ^s 13.90	H. Ai. LeV. Ai.	—96 —32 —81 —10	—52 —15 —25 +17
		1850 1855		+34 +35			1850 1855		—19 —20
ϵ Pegasi,	21 37 3.85	H. Ai. LeV. Ai.	—23 — 9 —46 +18	+21 + 8 +10 +45	γ Piscium,	23 9 38.92	H. Ai. LeV. Ai.	+37 — 9 +15	+54 +47 +42
		1850 1855		+21 +22			1854 1855		+48 +48
16 Pegasi,	21 46 28.03	H. Ai. LeV. Ai.	—41 —20	—24 + 7	κ^1 Piscium,	23 19 29.94	H. Ai. LeV. Ai.	+26 +37 — 3	+43 +93 +24
		1853 1855		— 9 — 9			1854 1855		+53 +54
θ Aquarii,	22 9 10.75	H. Ai. LeV. Ai.	— 1 —41 + 2	+16 +15 +29	ι Piscium,	23 32 29.55	H. Ai. LeV. Ai.	+92 +86 +13 +29	+136 +103 + 69 + 56
		1854 1855		+20 +20			1850 1855		+ 91 + 96
η Aquarii,	22 27 54.24	H. Ai. LeV. Ai.	— 2 —19 + 9	+15 +37 +36	ω Piscium,	23 51 52.06	H. Ai. LeV. Ai.	— 3 —81 —41	+14 —25 —14
		1854 1855		+29 +30			1854 1855		— 8 — 8

NOTE. — The columns headed "Deviation" contain the difference "Observation less Computation," expressed in thousandths of seconds; the numbers in the first of these columns being the direct result from the Catalogues, and those in the second, the same corrected by the quantities on page 547.

TABLE VI.

	AR. 1855.0	Annual Variation.	Secular Variation.		AR. 1855.0	Annual Variation.	Secular Variation.
α Andromedæ,	^h 0 ^m 0 ^s 54.010	+3.08397	+0.01770	ϵ Leonis,	^h 9 ^m 37 ^s 36.818	+3.42179	-0.01798
γ Pegasi,	5 46.457	3.08076	+0.00970	π Leonis,	52 32.904	3.17822	-0.00819
12 Ceti,	22 38.393	3.06042	+0.00059	α Leonis,	10 0 38.763	3.20353	-0.01020
β Ceti,	36 18.568	3.01391	-0.00580	γ Leonis, prec.	11 58.388	3.31951	-0.01515
ϵ Piscium,	55 25.278	3.10944	+0.00852	ρ Leonis,	25 10.428	3.16739	-0.00817
θ Ceti,	1 16 46.597	+2.99669	+0.00158	l Leonis,	10 41 37.970	+3.16068	-0.00831
η Piscium,	23 43.811	3.19707	+0.01392	χ Leonis,	57 32.146	3.09982	-0.00581
ν Piscium,	33 53.356	3.11423	-0.00893	δ Leonis,	11 6 23.529	3.20499	-0.01354
β Arietis,	46 38.293	3.29597	-0.01809	δ Crateris,	12 5.677	2.99470	+0.00613
α Arietis,	59 0.500	3.36392	+0.02010	ν Leonis,	29 31.532	3.07136	+0.00008
67 Ceti,	2 9 45.178	+2.98604	+0.00479	β Leonis,	11 41 39.669	+3.06661	-0.00770
ξ^2 Ceti,	20 27.263	3.17892	-0.01153	β Virginis,	43 8.533	3.12472	-0.00060
γ Ceti,	35 47.478	3.10049	-0.00928	ϵ Corvi,	12 2 40.436	3.07399	+0.01379
α Ceti,	54 42.231	3.12678	-0.00970	η Virginis,	12 29.334	3.06671	-0.00273
δ Arietis,	3 3 20.686	3.41691	-0.01717	β Corvi,	26 46.732	3.13101	-0.01603
η Tauri,	3 38 52.340	+3.55008	+0.01789	γ Virginis, med.	12 34 18.925	+3.03755	+0.00403
γ Eridani,	51 15.982	2.79480	-0.00475	12 Canum Ven.	49 14.342	2.81928	-0.01561
α' Eridani,	4 4 47.401	2.92074	-0.00600	θ Virginis,	13 2 26.775	3.09894	+0.00758
ϵ Tauri,	20 9.292	3.49347	-0.01244	α Virginis,	17 33.567	3.14988	-0.01120
α Tauri,	27 36.289	3.43414	-0.01090	ζ Virginis,	27 18.473	3.05219	+0.00611
ι Aurigæ,	4 47 33.416	+3.89371	+0.01523	η Boötis,	13 47 46.875	+2.85875	-0.00066
ϵ Leporis,	59 19.456	2.53580	-0.00342	τ Virginis,	54 16.198	3.04728	+0.00634
α Aurigæ,	5 5 59.061	4.42031	-0.01840	α Boötis,	14 9 2.949	2.73349	-0.00120
β Orionis,	7 34.294	2.88069	-0.00430	ρ Boötis,	25 34.862	2.58811	-0.00169
β Tauri,	17 7.747	3.78683	-0.00890	ϵ Boötis, seq.	38 39.307	2.62017	-0.00005
δ Orionis,	5 24 36.050	+3.06375	+0.00410	α^1 Libræ,	14 42 40.403	+3.30308	+0.01560
ϵ Leporis,	26 20.195	2.64574	-0.00319	α^2 Libræ,	42 51.833	3.30414	-0.01550
ϵ Orionis,	28 51.454	3.04138	-0.00381	ψ Boötis,	58 14.039	2.57055	-0.00113
α Orionis,	47 19.409	3.24714	-0.00310	β Libræ,	15 9 12.571	3.21778	-0.01188
ν Orionis,	59 17.641	3.42628	-0.00227	α Coronæ,	28 33.018	2.53833	-0.00240
μ Geminorum,	6 14 11.325	+3.63290	+0.00023	α Serpentis,	15 37 7.734	+2.94935	+0.00630
γ Geminorum,	29 20.126	3.46792	-0.00094	β Scorpii,	57 0.728	3.47595	-0.01455
α Canis Maj.*	38 45.452	2.64508	-0.00040	δ Ophiuchi,	16 6 45.037	3.13560	-0.00846
ϵ Canis Maj.	52 55.718	2.35827	-0.00164	α Scorpii,	20 31.399	3.66500	-0.01570
γ Canis Maj.	57 11.948	2.71602	-0.00067	ζ Herculis,	35 49.253	2.26165	-0.00319
δ Geminorum,	7 11 27.621	+3.59256	-0.00676	α Ophiuchi,	16 50 48.433	+2.83429	+0.00458
α Geminorum,†	25 20.245	3.84131	-0.01250	α Herculis,	17 8 2.283	2.73289	-0.00370
α Canis Min.	31 42.628	3.14698	-0.00440	θ Ophiuchi,	13 6.499	3.67702	-0.00871
β Geminorum,	36 26.276	3.68356	-0.01220	α Ophiuchi,	28 12.321	2.78117	-0.00350
χ Geminorum,	54 36.413	3.69912	-0.01429	μ Herculis,	40 47.159	2.34272	+0.00345
ι Navis,	8 1 22.206	+2.55499	+0.00107	μ^1 Sagittarii,	18 5 5.560	+3.58524	+0.00154
η Cancri,	24 19.092	3.48165	-0.01281	α Lyræ,	32 1.781	2.03091	+0.00160
ϵ Hydræ,	39 5.691	3.18498	-0.00692	β Lyræ,	44 43.644	2.21283	-0.00172
83 Cancri,	9 10 53.010	3.35922	-0.01337	ζ Aquilæ,	58 44.754	2.75318	-0.00061
α Hydræ,	20 27.725	+2.94942	-0.00150	ω Aquilæ,	19 11 0.633	+2.81459	-0.00003

* Peters's correction is yet to be added.

† Mean of the two stars.

	AR. 1855.0	Annual Variation.	Secular Variation.		AR. 1855.0	Annual Variation.	Secular Variation.
δ Aquilæ	^h 19 ^m 18 ^s 11.233	^s +3.02489	^s -0.00153	ϵ Pegasi,	^h 21 ^m 37 ^s 3.872	^s +2.94836	^s -0.00059
λ^2 Sagittarii,	27 52.796	3.65940	-0.00965	16 Pegasi,	46 28.021	2.72578	+0.00513
γ Aquilæ,	39 21.991	2.85281	-0.00080	α Aquarii,	58 20.150	3.08414	-0.00430
α Aquilæ,	43 42.531	2.92881	-0.00140	θ Aquarii,	22 9 10.770	3.17178	-0.00771
β Aquilæ,	48 11.470	2.94775	-0.00150	η Aquarii,	27 54.270	3.08381	-0.00324
α^1 Capricorni,	20 9 36.510	+3.33175	-0.00810	ζ Pegasi,	22 34 13.880	+2.98752	+0.00211
α^2 Capricorni,	10 0.414	3.33500	-0.00810	α Piscis Austr.	49 37.775	3.33287	-0.02170
ρ Capricorni,	20 35.152	3.42960	-0.01118	α Pegasi,	57 32.469	2.98307	+0.00530
α Cygni,	36 29.380	2.04250	+0.00240	γ Piscium,	23 9 38.968	3.10795	+0.00029
32 Vulpeculæ,	48 22.901	2.55446	+0.00264	κ^1 Piscium,	19 29.994	3.07564	-0.00021
61 Cygni, med.	21 0 24.775	+2.67784	+0.00392	ι Piscium,	23 32 29.646	+3.08413	+0.00281
ζ Cygni,	6 46.027	2.54826	+0.00384	ω Piscium,	51 52.052	+3.07735	+0.00445
β Aquarii,	23 55.385	3.16430	-0.00711				

TABLE VI. SUPPLEMENT.

	AR. 1855.0	Annual Variation.	Secular Variation.		AR. 1855.0	Annual Variation.	Secular Variation.
α Cassiopeiæ,	^h 0 ^m 32 ^s 18.284	^s +3.35312	^s +0.05440	η Ursæ Maj.	^h 13 ^m 41 ^s 49.377	^s +2.37462	^s -0.01050
α Persei,	3 13 59.591	4.24123	+0.04850	β Ursæ Min.	14 51 10.547	-0.26640	+0.10660
ι Ursæ Maj.	8 49 15.637	4.14858	-0.04433	β Draconis,	17 27 9.556	+1.35102	+0.00545
θ Ursæ Maj.	9 23 8.047	4.06080	-0.05615	γ Draconis,	17 53 14.502	-1.39321	+0.00350
α Ursæ Maj.	10 54 44.415	3.77579	-0.08380	α Cephei,	21 15 6.946	-1.43846	-0.00640
γ Ursæ Maj.	11 46 11.102	+3.19678	-0.04440	β Cephei,	21 26 46.341	-0.80464	-0.03300

NOTES AND ERRATA.

In Table II., λ Ursæ Minoris B., $\Delta \delta'$ (Rob.) for $-0''.42$ read $-0''.29$.

51 Cephei H., for Airy, 1845, read Airy, 1840, 1839.

for $\Delta \alpha' + 7''.67$ read $-7''.67$.

for $\Delta \alpha' \cos \delta' + 0.37$ read -0.37

323 Cephei B., dele Airy, 1840.

Table III. is not affected by these errata.

The order of some of the dates in Table II. is reversed in printing: that is, the date for Declination is before that for A.R.

It should perhaps have been stated, that the logarithms a, b, c, d in Table IV. are in the original order of Bessel; the English have arbitrarily changed a, b, c, d to c, d, a, b , and the same inconvenient alteration has been made in the American Ephemeris.

Log a is the log of the annual precession in A.R.; μ, μ' are proper motion; ν is $-\frac{1}{2} \frac{d^2 x}{d \tau^2}$.

In reducing to apparent place for a fraction τ of the year 1865 + n , we interpolate log a, b, c, d for the time 1865 + $n + \tau$, and we shall have (a° being A.R. for 1865),

$$a' - a^\circ = (A + n) a + Bb + Cc + Dd + (\tau + n) \mu + (\tau + n)^2 \nu.$$

This includes all the sensible terms except the very small ones depending on $\odot + \Omega$, $\odot - \Omega$, if the tables for Log A, B , etc., include them, as do O. Struve's *Tabulæ Quantitatum Besselianarum*.